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S.I. Sulsky, K.A. Mundt, C. Bigelow and P.J. Amoroso

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Research Institute of Environmental Medicine
Kansas St.
Natick, MA 01760-5007

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13. ABSTRACT *(Maximum 200 words)*

Aims: To identify sociodemographic and occupational determinants of knee related disability discharge from the US Army among enlisted women, and to investigate effect modification.
Methods: A case-control study of 692 cases of knee related disability discharge and 2080 incidence density matched controls nested within the population of all 244,000 enlisted women on active duty in the US Army, 1980-97. We used logistic regression to identify determinants of disability, stratified to explore effect modification by demographic and work characteristics.
Results: The risk of disability discharge was twice as high (odds ratio (OR) 2.4, 95% confidence interval (CI): 1.71 to 3.47)for the oldest (33-60 years) versus the youngest (17-21 years) women. Non-whites had lower risk than whites (OR 0.5, 95% CI: 0.41 to 0.60), as did married (OR 0.7, 95% CI: 0.54 to 0.81) relative to non-married women. Those of lower rank (pay grades E1-E3) were at five times the risk of disability discharge compared to those of higher ranks (pay grades E4-E9, OR 5.0, 95%CI: 2.86 to 8.33), while ORs were highest for those with longer duration of service compared to women on active duty for a year or less (OR 1.4, 95% CI: 0.8 to 2.55 after 12 years). Race modified several effects, including that of rank. Age, duration of service, and pay grade were too highly correlated to draw firm conclusions about their independent modifying effects on risk of disability discharge from the Army.
Conclusions: Sociodemographic factors had larger effects than occupational characteristics on risk of knee related disability discharge from the US Army. Interactions suggest subgroups at differing risk levels that might be targeted for more detailed investigations.

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Risk factors for occupational knee related disability among enlisted women in the US Army

S I Sulsky, K A Mundt, C Bigelow, P J Amoroso

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See end of article for authors' affiliations

Correspondence to: Dr Sulsky, Applied Epidemiology, Inc., PO Box 2424, Amherst, MA 01004, USA; ssulsky@appliedepidemiology.com

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Conclusions: Sociodemographic factors had larger effects than occupational characteristics on risk of knee related disability discharge from the US Army. Interactions suggest subgroups at differing risk levels that might be targeted for more detailed investigations.

During calendar year 2000, cases of occupational illnesses and injuries in the United States occurred at the rate of 6.1 per 100 full time equivalents (FTE). Injuries accounted for the vast majority of these cases, 5.8/100 FTE.[1] The consequences of occupational injuries include physical, psychological, and economic components for the injured worker, and also affect coworkers and employers.[2] Although the majority of occupational musculoskeletal injuries heal successfully, some result in long term or permanent disability. Extended periods of lost work time as a result of occupational disability add to the human and the economic costs, both for the person injured and the employer.

Occupational musculoskeletal disabilities

A large proportion of occupational injuries affect the musculoskeletal system.[3] During fiscal year 1994, for example, musculoskeletal conditions accounted for 53% of all disability discharges from the US Army. The next most common category of disability discharge, mental disorders, accounted for only 14% of disabilities.[4 5]

Among occupational musculoskeletal injuries and disabilities, the knee is one of the most common sites of occurrence. Physical demands have been associated with knee injuries and subsequent long term knee disorders. These demands may be associated with occupational activities, such as sustaining static loads, lifting, and prolonged kneeling.[6–10] Leisure activities such as running and participation in sports have also been implicated in the development of knee injury and disability.[11 12]

Knee related disabilities have been reported to vary across sociodemographic as well as occupational groups. Feuerstein *et al* found that the risk of discharge from the US Army for any musculoskeletal disability was higher for women compared to men between 1990 and 1994, and that risks were dependent on job code. For both men and women, knee impairments were the third most common reason for discharge from service.[13] In a pilot study, we observed that the risk of discharge from the Army between 1980 and 1994 for all knee related disabilities depended on gender, race, and age, and there were complex interactions among these sociodemographic characteristics.[14 15]

The purpose of this study was to identify independent occupational determinants of knee related disability discharge from the Army among enlisted women, taking into account the effect of sociodemographic characteristics. We restricted the study to women because of differences in baseline risk and risk factors experienced by men and women, described above. The study outcome of disability discharge from the US Army was used as a marker for severe injury; disability discharges in the Army are granted for conditions that impair one's ability to perform one's duty. We chose to conduct the study within the Army population for a number of practical and methodological reasons: (1) Its population consists largely of healthy individuals selected to be free of serious health conditions; preaccession physical examinations and interviews are conducted to rule out the presence of many pre-existing injuries and health conditions. (2) The wide range of jobs in the Army enables the analysis of a variety of occupational factors within the same population; civilian occupational injury studies typically focus on one or two specific jobs or tasks. (3) Many military jobs are physically demanding, representing high risk for injury and disability. (4) Large numbers of women and members of racial/ethnic minorities are employed by the Army,

Abbreviations: CI, confidence interval; CMF, career management field; DMOS, duty military occupational specialty; FTE, full time equivalent; OR, odds ratio; PMOS, primary military occupational specialty; TAIHOD, Total Army Injury and Health Outcomes Database; VASRD, Veteran's Administration System for Rating Disability

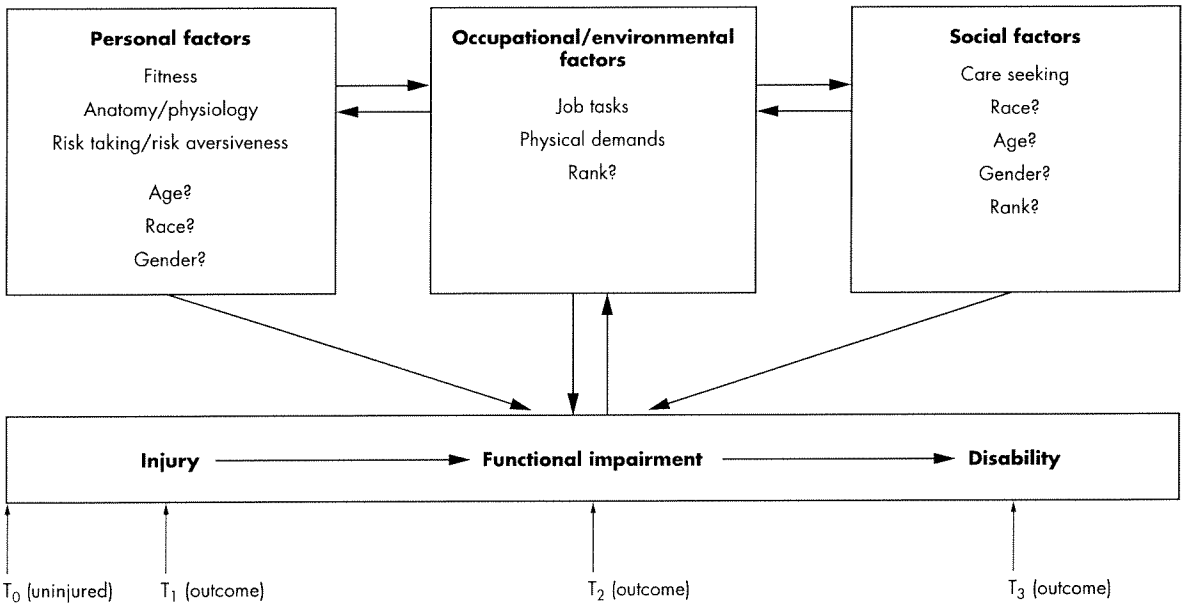

Figure 1 Conceptual model describing the inter-relation between personal, occupational/environmental, and social factors, and their impact on the progression from occupational injury to impairment to disability.

allowing for the investigation of demographic differences in risk. (5) Most military jobs are also represented in the civilian sector. Therefore, risk factors for occupational disability identified in the Army should also pertain to civilian workers.

Conceptual model

"Occupational disability" represents the culmination of a series of events, shown in fig 1. This model is similar to one proposed by Burdorf *et al* in that it addresses the multidimensional and multidirectional nature of the relations to be considered in studies of injury and disability.[16] The models differ, however, in focus: Burdorf *et al* use their model to help define the full range and timing of exposures that influence the progression from uninjured to disabled, while our model is meant to also assist in the development of research questions pertinent to any of the range of possible outcomes.

The figure shows the sequence of events for an individual initially free of a specific injury or disability (T_0), who either becomes injured or recognises an injury (T_1). Risk factors for this injury operate between T_0 and T_1. The injury may or may not require treatment, be treated appropriately, or heal. If healing is impossible or incomplete, some functional impairment may ensue (T_2). Factors that influence healing operate between T_1 and T_2; these may include factors or characteristics that also influence the risk of injury. If the impairment reaches some level of severity, a combination of medical and administrative evaluations may lead to a determination of occupational disability (T_3). This process and its duration are likely to be affected and modified by many factors. Some factors may operate only between T_2 and T_3, others may operate at various points, and still others may be in effect throughout the time line.

Determinants of occupational injury, impairment, and disability can be broadly grouped into three categories: personal, occupational/environmental, and social. Factors in any or all of these categories may play a role in an individual's progression from uninjured to disabled. Interactions among factors may also influence events at any point(s) in time. Aetiological research properly focuses on factors that operate before the injury (T_1). However, functional impairment (T_2) and disability (T_3) can be conceptualised as separate outcomes.

Different questions can be addressed by identifying factors that operate at different points along the time line. Some research questions may best be answered in analyses that take into account the initial injury occurrence (for example, risk factors for impairment given injury); others (for example, risk factors for disability) may be addressed without directly considering the causes of the initial injury. As a simple example, if employees of a particular manufacturing facility suffer low rates of injury, but high rates of occupational disability following injury (that is, low probability of return to work), then it would be both reasonable and efficient to focus research on factors that operate at T_1 and later.

MATERIALS AND METHODS

Data sources

The Total Army Injury and Health Outcomes Database (TAIHOD) is a relational database linking demographic and occupational information with databases tracking hospitalisations, lost work time injuries, and disability determinations. At the time of these analyses, data were complete for all personnel on active duty in the Army from 1980 to 1998. The TAIHOD is updated annually, and currently consists of data for more than 2.5 million individuals. The structure and contents of TAIHOD have been described elsewhere.[15]

Case definition

Cases were identified from the disability database. After reviewing all disability codes in use, we identified 11 Veteran's Administration System for Rating Disability (VASRD) codes that might indicate a functional disability related to a knee problem (table 1). Some of the codes refer to conditions specific to the knee, while others more generally involve the lower leg.

Case records are the first recorded knee related disability finding for enlisted women who were on active duty in the regular Army during the calendar year of the disability determination, or the year prior. Since the database was compiled in 1980, the first recorded disability finding may not represent the first knee disability if the person was placed on temporary disability before 1980, or if the first disability determination occurred after 1980 but was not properly recorded in the database.

Eligibility period for cases

We did not include all eligible cases recorded in the TAIHOD, for two reasons. Firstly, preliminary analyses showed that the

Table 1 Knee related disabilities and case counts for enlisted women in the US Army, based on Veteran's Administration System for Rating Disability (VASRD) codes, 1980–97

Disability name	All cases		Analysis set	
	n	%	n	%
Recurrent subluxation or lateral instability of knee	635	63.5	459	65.38
Impairment of femur*	188	18.8	129	18.38
Impairment of tibia and fibula†	116	11.6	71	10.11
Removal of semilunar cartilage	44	4.40	32	4.56
Genu recurvatum	6	0.60	3	0.43
Dislocation of semilunar cartilage	7	0.70	1	0.14
Knee replacement	1	0.10	1	0.14
Thigh amputation	1	0.10	0	0.00
Ankylosis of knee	0	0.00	0	0.00
Amputation with loss of extrinsic pelvic girdle muscles	0	0.00	0	0.00
Amputation 1/3 of the distance from the perineum to the knee	2	0.20	2	0.28
Total	1000	100	702	100

*Includes malunion of femur with knee or hip disability.
†Includes malunion with knee or ankle instability.

database might be less complete for 1980–82 compared to later calendar years (not shown). Secondly, in the Army, the administrative process of disability determination can take months or years to complete. In pilot data, the average interval between first recorded knee related hospitalisation and disability discharge was two years (not shown). Since we planned to use these data for a series of related analyses, it was important to define a source population that would be directly comparable across studies. Therefore, we excluded disability cases reported before 1984 to ensure reasonably complete case ascertainment, and cases reported after 1994 to ensure a sufficient interval between injury and disability determination for the administrative process to be completed. The latter was a consideration for other planned analyses A total of 702 enlisted women had knee related disability discharges and met the inclusion criteria for this period.

Control definition

Controls comprised a simple random sample from the population of all enlisted women with a record in the personnel file for a given year. We sampled controls from each year in proportion to the number of cases recorded in that year to approximate incidence density sampling for the study period. We excluded any potential control with a knee disability recorded in any year prior to the year from which she was sampled. We also excluded potential controls with pay grade indicating officer status, or with missing data for gender. Three controls for each case were included (n = 2106).

Job codes and career management fields

The TAIHOD records both primary military occupational specialty (PMOS) and duty military occupational specialty (DMOS). PMOS represents a job for which training was received, while DMOS codes the current duty assignment. In previous work, it was shown that PMOS was more often complete than DMOS, but, when both were recorded, the two codes tended to agree ($r > 0.90$).[17] Given the high correlation, and assuming that a change in PMOS would represent a durable change in assignment, we used the PMOS to identify jobs. Preliminary analyses showed that the rate of job changes was low (less than one per year), and similar for cases and controls (not shown). Therefore, to categorise individuals by job title, we used the PMOS recorded during the 12 months prior to case/control identification.

There had been a number of revisions to PMOS coding by the Army during the study period.[18] In order to map PMOS to occupational tasks, we revised obsolete codes that represented at least 1% of records in the data library (roughly the 50 most common PMOS) to follow the most current coding scheme.[19] All PMOS were then coded to identify the presence or absence of specific physical task requirements according to the Military Occupational Classification and Structure Manual[18] following the procedures developed by Williams.[19] We also mapped PMOS to the eleven career management fields (CMF) used by the Army for research and administrative purposes.

Statistical methods

We used SAS version 6.12 [20] for data management and analysis. We used *t* tests, Mann-Whitney tests, and single predictor logistic regression models to identify terms with sufficient variability and/or a sufficiently strong crude association with the outcome to be included as candidates in multiple logistic regression models of the probability of knee related disability discharge. Because of the number of cases and controls being compared, and hence a high degree of statistical power (80–99% power to detect a 5% difference in proportions exposed with a type I error rate of 1–2%, depending on exposure prevalence[21]), we developed a decision rule to identify candidate terms that would be of both practical and statistical importance. Candidates for the multivariable models were required to have both an odds ratio (OR) showing a 50% change from the null value of 1.0 ($OR \leq 0.67$, $OR \geq 1.5$) and $p \leq 0.05$ in single predictor models.

The goal of this study was to identify occupational risk factors for knee related disability discharge from the Army while taking into account demographic characteristics that influence risk. Therefore, we first identified the best model to represent demographic predictors of risk from among those identified in preliminary analyses, then added individual work related covariates to the demographic model in order to identify their independent effects, if any. Terms that failed to contribute to the model according to the decision rule defined above were removed. A 20% change in any regression coefficient was taken to indicate important confounding by a previously excluded covariate, and that term was added back into the final model.[22] We investigated effect modification by several characteristics identified a priori: race, age, duration of service, and pay grade. The goodness of fit of each final model (from the main analysis and from each stratified analysis) was evaluated using the Hosmer and Lemeshow statistic.[22]

RESULTS

Table 2 shows the demographic and occupational characteristics of cases and controls included in the analytical subset. The age distribution was similar for cases and controls, although cases were slightly more likely to be in the two oldest quintiles of age. Cases were also more likely to be white and more likely to be unmarried compared to controls. Cases were also over represented in the first two quintiles of duration of service. Perhaps because of their shorter service history, cases were more likely to

Table 2 Sociodemographic characteristics of enlisted women in the US Army, 1984–94

	Knee related disability discharge				
	Cases* (n=702)		Controls (n=2106)		
	n	%	n	%	Unadjusted OR†
Age quintiles‡					
17–20 years	119	16.95	341	16.21	1.0
21–22 years	119	16.95	395	18.77	0.86
23–25 years	133	18.95	483	22.96	0.79
26–32 years	206	29.34	568	27.00	1.04
33–60 years	125	17.81	317	15.07	1.13
Race					
Unknown	1	0.14	3	0.14	Not calculated
White	469	66.81	1050	50.0	1.0
Black	198	28.21	916	43.49	0.59
Other	34	4.84	137	6.36	0.84
Marital status					
Unknown	9	1.28	21	1.0	Not calculated
Single	393	55.98	976	46.34	1.0
Married	250	35.61	944	44.82	0.66
Divorced/separated	50	7.12	165	7.83	0.75
Education					
≤4 HS§	1	0.14	10	0.47	0.3
HS or GED§	585	83.0	1755	83.0	1.0
≥1 year college	115	16.0	340	16.0	1.02
Alternate, unknown	1	0.14	1	0.05	Not calculated
Pay grade					
E1–E3	281	40.0	637	30.3	1.0
E4–E6	367	52.3	1200	57.0	0.67
E7–E9	54	7.7	269	12.8	0.34
Duration of service‡					
1–15 months	201	28.63	467	22.17	1.0
16–32 months	162	23.08	459	21.79	0.82
33–59 months	115	16.38	479	22.74	0.56
60–119 months	157	22.36	459	21.79	0.80
120–414 months	67	9.54	242	11.49	0.64
CMF¶					
Support	192	27.39	781	37.12	1.0
Infantry	5	0.71	24	1.14	0.85
E-M repair	85	12.13	179	8.51	1.93
Service	116	16.55	283	13.45	1.64
Communications	102	14.55	274	13.02	1.54
Health care	116	16.55	377	17.92	1.25
Electrical	52	7.42	113	5.37	1.95
Technical	25	3.57	54	2.57	1.89
Craftsworkers	8	1.14	18	0.86	1.81
Non-occupational	0	0	1	0.05	Not calculated
Physical tasks					
Lift/carry					
None	26	4.96	80	4.98	1.0
1–25 pounds	122	23.28	458	28.54	0.76
26–50 pounds	59	11.26	213	13.27	0.79
51–75 pounds	78	14.89	231	14.39	0.96
76–100 pounds	157	29.96	435	27.10	1.03
101–125 pounds	48	9.16	101	6.29	1.35
126–150 pounds	0	0	0	0	Not calculated
151–175 pounds	24	4.58	69	4.30	0.99
Raises 267 pounds	10	1.91	18	1.12	1.58
Push/pull**					
None	389	74.24	1229	76.57	1.0
<130 pounds	77	14.69	223	13.89	1.05
≥130 pounds	39	7.44	107	6.67	1.11
Foot/pound force	19	3.63	46	2.87	1.26
Uses a wrench	0	0	0	0	Not calculated
Kneeling**					
None	305	58.54	844	53.42	1.0
While shovelling, lifting	54	10.36	143	9.05	1.03
While filing	14	2.69	34	2.15	1.16
For prolonged periods	148	28.41	559	35.38	0.75
Sitting**					
None	118	22.52	466	29.03	1.0
Any	416	77.48	1139	70.97	0.71
Standing**					
None	251	47.90	838	52.21	1.0
Any	273	52.10	767	47.79	0.84

*Cases: knee related disability discharge from the Army, 1984–94.
†OR, odds ratio.
‡Quintiles based on frequency distribution observed for all controls included in the data library.
§HS, high school; GED, Graduate Equivalency Degree.
¶CMF, career management field. Support = support/administration; infantry = infantry/gun crews; e-m repair = electrical/mechanical equipment repair; service = service/supply; communications = communications/intelligence; electrical = electrical equipment repair; technical = technical/allied specialties; "non-occupational" includes trainees, prisoners, and patients.
**Available for 521 cases and 1580 controls.

Table 3 Relative odds ratios (OR) of discharge from the Army for any knee related disability

	All women*			White women*			Non-white women*		
	OR†	95% CI†	p†	OR†	95% CI†	p†	OR†	95% CI†	p†
Age‡									
17–21 years	1.0§	–	–	1.0§	–	–	1.0§	–	–
21–22 years	0.79	0.57 to 1.09	0.15	0.68	0.46 to 1.01	0.05	1.09	0.61 to 1.96	0.78
22–25 years	0.94	0.70 to 1.27	0.69	0.86	0.60 to 1.23	0.41	1.11	0.64 to 1.93	0.71
26–32 years	1.59	1.21 to 2.09	0.001	1.44	1.02 to 2.04	0.04	1.96	1.23 to 3.12	0.004
33–60 years	2.44	1.71 to 3.47	<0.0001	2.66	1.66 to 4.26	<0.0001	2.41	1.37 to 4.26	<0.0001
Race									
White	1.0§	–	–	–	–	–	–	–	–
Non-white	0.50	0.41 to 0.60	<0.0001	–	–	–	–	–	–
Married									
No¶	1.0§	–	–	1.0§	–	–	1.0§	–	–
Yes	0.66	0.54 to 0.81	<0.0001	0.63	0.49 to 0.81	0.0003	0.71	0.51 to 0.99	0.04
Duration of service‡									
1–15 months	1.0§	–	–	1.0§	–	–	1.0§	–	–
16–32 months	1.07	0.78 to 1.46	0.67	0.93	0.64 to 1.36	0.71	1.52	0.88 to 2.65	0.14
33–59 months	0.83	0.55 to 1.25	0.36	0.87	0.53 to 1.44	0.60	0.74	0.35 to 1.56	0.43
60–119 months	1.30	0.85 to 1.99	0.23	1.10	0.64 to 1.91	0.71	1.72	0.83 to 3.54	0.14
120–414 months	1.43	0.81 to 2.55	0.22	1.23	0.56 to 2.72	0.61	1.82	0.75 to 4.44	0.19
CMF**									
Support	1.0§	–	–	1.0§	–	–	1.0§	–	–
Infantry	0.77	0.28 to 2.08	0.60	0.66	0.18 to 2.40	0.53	0.95	0.20 to 4.53	0.95
E-M repair	1.62	1.11 to 2.37	0.01	1.85	1.15 to 2.96	0.01	1.19	0.60 to 2.39	0.62
Communication	1.37	1.03 to 1.83	0.03	1.37	0.95 to 1.98	0.09	1.42	0.87 to 2.33	0.16
Health care	1.10	0.84 to 1.45	0.49	1.27	0.90 to 1.79	0.18	0.79	0.46 to 1.24	0.28
Technical	1.64	0.98 to 2.75	0.06	1.46	0.78 to 2.72	0.23	2.16	0.84 to 5.60	0.11
Electrical	1.59	1.16 to 2.19	0.004	1.42	0.95 to 2.13	0.09	2.13	1.27 to 3.58	0.004
Craftsworkers	1.55	0.65 to 3.72	0.33	1.53	0.48 to 4.92	0.47	1.50	0.40 to 5.63	0.55
Non-occupational	0	–	–	0	–	–	0	–	–
Pay grade									
E1–E3	1.0§	–	–	1.0§	–	–	1.0§	–	–
E4–E6	0.62	0.45 to 0.87	0.01	0.69	0.46 to 1.03	0.07	0.49	0.28 to 0.86	0.01
E7–E9	0.20	0.12 to 0.35	<0.0001	0.25	0.12 to 0.50	<0.0001	0.14	0.06 to 0.33	<0.0001

*All women: n=692 cases, n=2080 controls. Whites: n=469 cases, n=1050controls. Non-whites: n=223 cases, n=1030 controls.
†OR, odds ratio; 95% CI, 95% confidence interval; p, p value.
‡Quintiles based on distribution observed among all controls in data library.
§Referent category.
¶Includes never married and no longer married.
**CMF, career management field. Support = support/administration; infantry = infantry/gun crews; e-m repair = electrical/mechanical equipment repair; service = service/supply; communication = communications/intelligence; electrical = electrical equipment repair; technical = technical/allied specialties; "non-occupational" includes trainees, prisoners, and patients.

be among the lower pay grades (E1–E3) compared to controls. The three most common CMFs for both cases and controls were support/administration, service/supply, and health care. Cases were slightly over represented among the electrical/mechanical equipment repair, electrical equipment repair, and craftsworker CMFs. The physical tasks required of cases and controls were very much alike, reflecting their similarity with respect to the distribution of CMFs. Cases were somewhat more likely to be in jobs associated with lifting weights of at least 100 pounds, and were slightly more likely than controls to be in jobs associated with sitting or standing.

In single predictor models, non-white race, being married, having longer duration of service, and higher pay grade were associated with lower risk of knee related disability discharge (table 2). Certain of the CMFs were associated with higher risk of disability discharge relative to the administration/support CMF. The CMFs with the highest odds ratios compared to support/administration were electrical/mechanical equipment repair, communications/intelligence, technical/allied specialties, electrical equipment repair, and service/supply. None of the specific job tasks considered met our definition of practical or statistical significance (table 2).

Multivariable analyses

In addition to quintiles of age and race (white/non-white), the final multivariable model included marital status (married yes/no), CMF, and pay grade. We included duration of service, in quintiles, because of its influence on the magnitude of the coefficients of the other terms in the model (table 3).

Several terms that were only weakly associated with risk of knee related disability discharge in single predictor models were more strongly associated with risk when other factors were controlled in the multivariable setting. Women in the two oldest quintiles of age (26–32 years and 33–60 years) experienced approximately twice the risk relative to those in the youngest age group. Non-white women had a 50% lower risk of knee related disability discharge relative to white women, and there was a 44% lower risk for married compared to unmarried women. Although no job task showed an effect on the risk of knee related disability discharge, several of the CMFs did show higher risks than administration/support. Three CMFs had about a 60% higher risk: technical/allied specialties (OR = 1.64, 95% CI: 0.98 to 2.75); electrical/mechanical equipment repair (OR = 1.62, 95% CI: 1.11 to 2.37); and electrical equipment repair (OR = 1.59, 95% CI: 1.16 to 2.19). Even after controlling for age, duration of service and CMF, women in pay grades E4–E6 had a 40% lower risk than women in grades E1–E3, and women in grades E7–E9 had an 80% lower risk than women in the lowest three pay grades. The Hosmer-Lemeshow goodness of fit statistic showed adequate fit of this model to the data (statistic = 11.2, p = 0.20 on 8 degrees of freedom).

As table 3 shows, there was evidence of effect modification by race for risks associated with higher pay grades (where the decrease in risk for grades E4 and above relative to E1–E3 was greater for non-whites than whites) and certain CMFs (electrical/mechanical equipment repair; health care; technical/allied specialties; electrical equipment repair). For

Main messages

- Sociodemographic factors had larger effects than occupational characteristics on risk of knee related disability discharge from the US Army.
- Interactions between sociodemographic and occupational factors suggest subgroups with differing risk levels may be identified.

Policy implications

- Occupational risk factors are modifiable.
- The identification of higher risk subgroups within the population suggests targeted interventions may be developed to reduce the impact of occupational injury and disability.

ability to heal following physical stresses, or both; (3) race is an indicator of one or more variations in the disability determination process.

We also evaluated effect modification by age, duration of service, and pay grade. Not surprisingly, the strong interrelation among these covariates hampered our ability to model their individual effects. Nevertheless, we did find evidence of changes in the risk of knee related disability associated with specific jobs across categories of these variables. This interaction suggests that job tasks within CMF, and therefore, work related exposures that determine risk, may be influenced by rank or seniority. More detailed evaluations of specific jobs and their tasks, with analyses possibly restricted to various demographic subgroups, may be helpful in sorting out these complex associations.

The VASRD codes used to identify cases include some reasons for disability discharge that clearly involve the knee, while others are more generally related to the lower leg. This mixture of outcomes probably reduced our ability to identify specific determinants of knee related disability discharge. However, when we re-ran the final multivariate model for the subset of 459 women discharged for recurrent subluxation of the knee, the patterns of risks for disability discharge were similar to those described above. The only notable differences from the results of the main analysis were for duration of service, where the odds ratios for the subset of cases of recurrent subluxation of the knee were all around two (data not shown).

Information for this study was abstracted from a database with administrative origins, and the frequently documented shortcomings of administrative data apply. These include a lack of information regarding quality control procedures, missing data, and coding schemes not developed for the convenience of the researcher (for example, too many or too few codes for certain data elements).

In summary, we aimed to identify the determinants of occupational knee related disability among enlisted women in the US Army, and we found that risks varied according to both demographic and work related characteristics. These determinants probably include risk factors for injury and factors that influence the progression from injury to disability, including the disability determination process (fig 1). By focusing on disability as an outcome, we identified the subset of knee injuries that were severe, thus representing a serious and costly social and health issue for all involved. As we were able, using the TAIHOD, to identify interactions between occupational and sociodemographic determinants of risk, it may be possible to identify specific high risk work tasks or occupational subgroups that could be studied in more detail to identify determinants of knee related disability and to target appropriate interventions.

Authors' affiliations
S I Sulsky, K A Mundt, C Bigelow, Applied Epidemiology, Inc., Amherst, MA, USA
P J Amoroso, US Army Research Institute of Environmental Medicine, Natick, MA, USA

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